"RAPID CONNECTION/ASSEMBLY SYSTEM FOR LIFT GUIDES"

DESCRIPTION

This invention deals with a rapid assembly connection system for lift guides.

Lift guides require greater and greater quality and precision coefficients each day, basically due to the users' comfort requirements. The connections between these guides must be carried out in compliance with these quality and precision requirements.

A guide connection is comprised of three basic elements:

a) the actual guides,

b) guide connection plate,

c) connecting screws of guides with the connection plate.

All the connection systems known suffer from two problems:

a) these three basic elements are presented independently in the assembly

b) the alignment of the guides and the connection plate is complicated per se and this difficulty is greater if we bear in mind that it has to be carried out in places that are difficult to access and in complicated positions.

In a traditional guide connection system, all of this results in the coupling operations of the three basic elements, their alignment and anchor/fastening, usually taking around 9 minutes.

It is understood perfectly that any improvement in the simplification of the assembly will represent a great advance in this technological field and will speed up the actual assembly without detriment of the quality and precision required.

The applicant has realised that in the known connection system, the connection plate and the guide flanges are joined vertically.

The applicant has solved these problems arranging for:

a) the connection plate to be divided into two plate parts that already have the connecting means/screws mounted

b) the flanges and the plate parts to be equipped with combined alignment configurations, so that their mutual coupling and relative alignment is carried out very quickly.

The connection plate and the guide flanges are joined together / tightened horizontally (laterally).

With the invention system, the coupling/alignment/anchor operations take 20 seconds.

More specifically, the rapid connection/assembly system for lift guides, where each guide includes a head-core on which a precision finish has been carried out on its upper reference surface (OX axis) and a precision finish on its side reference surfaces (OY axis) and one flange on each side, is characterised because:

a) at least one connection point is determined on each flange of each guide, situated at a predetermined set height with respect to the upper reference surface of the head and at a predetermined set distance with respect to its respective reference side surface of the head;

b) a machine finish open to the exterior is placed on the flanges around each connection point;

c) there are some connection plates, each one of which extends between the flanges of each side of at least two guides; this connection plate is organised into two plate parts that correspond to the flanges of each side and that can be moved on some torque means mounted on these plate parts which, when moved closer together, tighten these plate parts laterally against the flanges;

d) there are alignment elements on each plate part, which correspond centrally and combined with the machine finished at the connection points of the flanges, so that when the plate parts are tightened against the flanges, all the connection points of the flanges of each side of the guides are in a straight line.

In order to understand the subject of this invention better, a preferential form of practical execution is illustrated on the drawings, subject to incidental changes that take nothing away from its foundation.

Figures 1a and 1b show several general views in frontal perspective –figure 1a- and rear perspective –figure 1b- of a practical execution of the system targeted by the invention.

Figure 2 shows a ground plan corresponding to the previous figure.

Figure 3a shows a perspective view of a longitudinal-part (2a)) (plate part) for the execution of figures 1 and 2 ("U"-shaped profile).

Figure 3b shows a perspective view of a longitudinal-part (2a) (plate part) for the execution of figures 1 and 2, for an alternative execution (solid part).

Figure 4 shows a partial perspective view of figures 1 and 2 of one guide (1), with a solution of boxes/skating (1411 (open machine finish device) machined on the flanges (14).

Figures 5a and 5b show several general front–figure 5a- and rear –figure 5b- perspective views of another practical execution of the system targeted by the invention in which the open machined parts (141) of the guides to be joined together (1) are open through boxes and the connection plate (2) is comprised of two longitudinal-parts (2a) connected to each other with the tightening means, in this case by two sets of studs (21)/ nut (22).

Figures 6a and 6b show different general perspective views, one front and one rear of another practical execution of the system targeted by the invention in which the open machined parts (hidden) of the guides to be connected (1) are spaced open boxes and are connected together by continuous chamfers (15). These chamfers (15) are double and the connection plate (2) is comprised of two solid longitudinal-parts (2a) (plate parts) connected together by two sets of stud (21) / (22) (tightening means) and with a longitudinal box (25).

Figure 7 shows a general front perspective view of another practical execution of the system targeted by the invention in which the machined parts (141) of the guides to be connected together (1) are open boxes and the alignment elements (214) are die-stamped flanges integrated into the longitudinal-parts (2a).

Figure 8 is a schematic description of the connection with a minimum number of connection points (P) between each other, that is, one connection point (P) for each flange .

Below an example of a non-limitative practical execution of this invention is described.

The rapid connection/assembly system for lift guides, targeted by the invention, is used on guides (1), which include a core-head (13) and a flange (14) on each side.

According to said invention:

- The core-head (13) of each guide has a precision finish on its upper surface (11) – upper surface of reference according to OX-axis- and a precision finish on its side surfaces (12)- side surfaces of reference according to OY-axis-.

- Several connection points (P) are determined on each flange (14) of each guide (1), situated at a predetermined set height (h) with respect to the upper surface of reference (11) and at a predetermined set distance (a) with respect to the respective side surface of reference (12) (they form straight line l).

- There is a connection plate (2) that extends between the aforementioned connection points (P) of the flanges (14) of each side of at least two guides (1) placed continuously.

- There are some alignment elements (241) on the connection plate (2), combined with some open machined parts (141) at connection points (P) on the flanges (14).

- Each flange (14) forms in origin some machined finishes (141); these machined devices (141) are placed in opposing pairs (one on each flange) on the connection points (P): one pair or several pairs separated from each other by a distance (d_1) the last of these pairs being machined at any distance (d_2) from the end of the guide (1).

- The upper surface (11) and side surfaces (12) of the head (13) are used as reference to position the machined parts (141) in origin. Their centres coincide with the connection points (P), at a set distance (h) from the upper surface of reference (11) of the head (13) according to the OY-axis and at a set distance (a) from the side surfaces of reference (12) of the head (13) according to the OX-axis. All of this leads to a much shorter assembly time than that currently known and an automatic alignment on the OX and OY-axes by means of the machined parts open to the exterior (141) on the flanges (14).

- The connection plate (2) (figures 1 to 4) is organised into two plate parts (2a) (longitudinal-parts) with tightening means (2b) to bring them closer together or separate them, which, in origin form some protuberances (241) arranged into opposing pairs: at least two pairs separated from each other by a distance (d_4). These protuberances (241) form the alignment means integrated into the actual connection plate (2).

The open machined parts (141) formed on the flanges (14) of the guides (1) to be joined together are boxes that are open to the exterior –see figure 4-. These open machined parts (141) are separated from each other by a distance (d_1) and at a distance (d_2) from the end of the relative guide (1) to be joined.

These distances (d_1), (d_2) which, in principle, may be any, condition the distances of the connection plate (2) that are defined below.

In the execution example shown, the tightening means (2b) to bring the longitudinal-parts (2a) closer together or further apart, they are different cross-parts.

For a first variant of this execution example, -see figure 3a- each longitudinal-part (2a) is an elongated "U"-shaped profile with asymmetric flanges, which form conformation pairs (20) in both flanges -an anti-rotation opening (20a) and an open box (20b) that face each other in pairs- and which forms an end bend on one of them, with many protuberances (241) (alignment elements) opposing each other in pairs and centred and dimensionally combined with the boxes/skating (141) (open machined parts).

For a second variant of this execution example –see figure 3b-, each longitudinal-part (2a) is solid with pairs of openings (20) along its body, from which a wall extends that forms the protuberances (241).

In the execution example shown pairs of protuberances (241) have been machined in the longitudinal-parts (2a). The two inner pairs are machined at a distance (d_4) from each other and the

two outer pairs are machined at a distance (d_5) from each other –see figure 1a-.

$d_4 = 2d_2$ and $d_5 = d_1$ must be satisfied –see figures 1a and 4-.

The tightening means (2b) are comprised of a set of stud (21)/nut (22), which is inserted into a pair of opposing conformations (20). The maximum separation amplitude (d_3) between longitudinal-parts (2a) is limited by the head (21b) of the stud (21) and by the actual nut (22) and varies depending on the width of the guides (1) to be joined together. Therefore, according to the invention, one same connection plate (2) can be applied to join pairs of guides (1) of different widths (it is understood that, in each connection, the guides (1) are equal to each other).

The retention takes place by clamping the flanges (14) of the guides (1) to be connected between this alignment elements (protuberances) (241) inserting them into the boxes/skating (open machined parts) (141) and applying the nuts (22) of the sets of stud (21)/nut(22) that form the tightening means (2b). A rotation momentum takes place when tightening that makes the guides (1) rest upon the protuberances (214) and in the skatings (10) of the longitudinal-parts (2a).

With the executions of figures 5a, 5b, 6a and 6b, the alignment elements (3) are pre-mounted on the connection plate (2).

The open machined parts (141) conformed on the edges of the flanges (14) of the guides (1) to be connected are through open boxes.

In the execution example, in agreement with figures 6a and 6b, the structure of the connection plate (2) comprises plate parts (2a) and tightening means (2b) in a similar way and layout to that described, with the peculiarity that the plate parts (2a) include some machined parts (25) that are V-shaped longitudinal guides and the pre-mounted alignment means (3) are spigots inserted into these longitudinal-parts (plate parts (2a) so that they interrupt the continuity of these longitudinal guides (25) at distances (d_4), (d_5) also similar to those already described.

The open machined parts (141) formed on the flanges (14) of the guides (1) to be connected are open boxes attached to each other by continuous chamfers (15), which occupy at least the length of the flanges (14) in contact with the connection plate (2). These chamfers (15) may be simple or double –as in figures 6a and 6b- without altering, as a result, the essence of the invention, as it only require varying in a combined way the geometry of the "V"- shaped guides (25).

In the execution example – in agreement with figure 7- the open machined parts (141) on the connection points (P) formed at the edges of the flanges (14) of the guides (1) to be joined are through boxes.

Each longitudinal-part (plate part) (2a) is an elongated U-shaped profile that forms pairs of openings (20) on its flanges opposing each other in pairs and in its core many aligned die-stamped flanges (241) (alignment elements), also opposing each other in pairs.

Figure 8 shows by way of a diagram the simplest execution, that is, a connection point (P) for each flange (14) of each guide (1) aligned on each side forming straight lines (l).

5